style of decoration with glazed bricks was borrowed by the Persians, and we see it in the splendid decoration from Persepolis now in the Louvre at Paris.

It is to be hoped that Dr. Koldewey has still more important discoveries in store. H. R. HALL.

## *THE NEGLECT OF GROUP-THEORY.*

THE volume of "Proceedings of the London Mathematical Society," second series, vol. vii., contains twenty-six papers by such well-known mathematicians as Bateman, Bromwich, Burnside, Dickson, Dixon (A. C., and A. L.), Hardy, Harrison, Hobson, Lamb, Littlewood, Macdonald, Pidduck, Sommerville, and Young. While these are mainly of too technical a character to admit of discussion in this notice, attention should be directed to some remarks in Prof. Burnside's address on the "Theory of Groups of Finite Order," as affording an object-lesson on the important question of "England's neglect of mathematics." Prof. Burnside states :—

> "It is undoubtedly the fact that the theory of groups of finite order has failed, so far, to arouse the interests of any but a very small number of English mathematicians; and this want of interest in England, compared with the amount of attention devoted to the subject both on the Continent and in America, appears to me very remarkable." "So far as I have been able to learn, no course of lectures has ever been delivered either at Oxford or Cambridge on the theory of groups of finite order." "In fact, so far as the teaching of the subject in England is concerned, one may say that it does not exist."

It appears that during the twenty-one years of the now, alas! defunct "Part II." of the Mathematical Tripos, questions on finite groups have only appeared four times, and that it is doubtful whether four candidates have seriously studied the subject.

On the other side we have the following statement:

> "In Paris M. Jordan gives a course on the theory of groups of finite order at the Collège de France at regular intervals to an average class of six students, while the Galois theory of equations is lectured on at the Sorbonne and the École normal, as well as at one or two of the provincial universities.
>
> "In most German universities, the regular course of lectures on algebra, attended by large classes of students, contains an exposition of the more elementary parts of the theory of groups of permutations. In addition to this there are, in all the larger universities, special courses devoted to groups of finite order and to discontinuous groups, which attract a considerable number of students. For instance, such special courses last year were attended at Göttingen by thirty students, and at Freiburg by twelve.
>
> "In the United States all the leading universities offer regular courses in the theory of groups of finite order, with the exception of Harvard, where a course is given on the Galois theory of equations. In some cases the course is a yearly one, and in the others it is biennial. These courses attract from two or three up to ten or twelve students, who in general have already taken the B.A. degree."

Prof. Burnside offers some explanations for this neglect, but probably the reason is a very simple one. If any English mathematician specialises in the theory of groups (and at least one instance is known to the reviewer) no university will offer him adequate remuneration for a course of lectures on the subject; on the other hand, the mathematical departments of English institutions of university rank are deplorably understaffed in comparison with those in foreign countries, and their teachers are far too overburdened with elementary work to be able to start courses on a subject like "groups," in addition to meeting the necessary requirements of their examination syllabuses. Prof. Burnside suggests that the cause may partly be a lack of demand for instruction in the subject on the part of senior university students. But is it not the fact that such students are induced to give up advanced mathematical study and to take to experimental science in order to qualify for "research studentships?" If they persist in specialising in higher mathematics of any kind, they not infrequently do so at the risk of injuring their future prospects of obtaining appointments.

## *NOTES.*

POLITICAL services and commercial prosperity appear to be the claims to distinction of most of the people whose names are to be found in the list of New Year Honours. The list includes the names of few men of eminence in the intellectual world—whether of science, art, or literature. One Fellow of the Royal Society—Dr. David Ferrier—has been knighted; and among the twenty-four other new knights are Dr. H. B. Donkin, Mr. G. Laurence Gomme, and Dr. G. Newman. Even in these cases, however, the honour appears to have been conferred for public services rather than in recognition of scientific work. The list has been received with the usual chorus of congratulation by the daily papers, but it can in no way be regarded as truly representative of the men who are rendering the best services to the nation.

THE Oceanographical Institute provided by the Prince of Monaco at Paris will be inaugurated on Monday, January 23.

IT is announced that an association for the promotion of science, to be called the "Kaiser Wilhelm Gesellschaft," will shortly be formed in Germany. The first meeting of the association is to be held within the next week or two under the presidency of Prof. Emil Fischer, and the German Emperor proposes to be present.

THE Paris Academy of Sciences, at a meeting on December 29, 1910, discussed the question of the election of women as members of the Institute of France. We learn from the *Times* that the academy eventually came to the conclusion that each section of the institute has complete independence with regard to the election of members, and that each academy has the right to decide the question of the election of women to its membership. The subject is being discussed at a general meeting of the academies as we go to press.

WE regret to see the announcement of the death of one of the best known supporters of amateur astronomy in Germany, Dr. M. Wilhelm Meyer, who died recently at Meran, at the comparatively early age of fifty-eight. Dr. Meyer's astronomical career began at Geneva, of which observatory he was for a short time director. He signalised his connection with that observatory by an attempt to determine the density of the material near the nucleus of a comet by observing the displacement of stars over which the comet passed; but he is better known from his relations with the Urania Gesellschaft in Berlin and his efforts to encourage astronomical studies in those who frequented the observatory. He was successful in attracting those who were capable of using the equipment provided wisely and well. Among his pupils or followers may be mentioned Herr Witt, who discovered the planet Eros in the Urania Observatory. Many of his popular works have had a wide circulation, among which may be mentioned "Das Weltgebaude," a work addressed to those who were capable of following the detailed explanation of the more difficult problems in astronomy, and the

"Spaziergänge durch das Reich der Sterne." He also wrote on comets and meteors in a way to attract attention and stimulate enthusiasm.

THE Meteorological Office has, with the commencement of the present year, introduced considerable improvement in its Daily Weather Report. Dover has been discontinued as a reporting station, and Newquay has been added. The London observations are now taken at Kew, and not in St. James's Park as for some years past. The London area is, however, well served by supplementary observations given for Greenwich Observatory, City (Bunhill Row), Westminster (St. James's Park), and Hampstead. The graphic representations are greatly improved, and the area covered by the charts has been extended, so that the incorporation of the observations from the Atlantic Ocean received by radio-telegraphy will be much clearer.

THE summary of the weather for the year just issued by the Meteorological Office with its Weekly Weather Report shows that the mean temperature for the several districts of the United Kingdom was nowhere very different from the average. The absolutely highest temperature reported in the British Isles was 83°, which occurred both in the east of England and in the Midland counties, and the lowest was minus 10°, in the east of Scotland. The rainfall for the year was in excess of the average, except in the north and west of Scotland. The greatest excess was 9·12 inches, in the Channel Islands, and this was followed by an excess of 6·83 inches, in the south-west of England. The heaviest aggregate measurement was 49·74 inches, in the north of Scotland, and the least 25·24 inches, in the north-east of England. The largest number of rainy days during the year in any district was 257, in the south of Ireland, the least 194, in the north-east of England, and 195, in the south-east of England. The duration of bright sunshine varied considerably in different districts, but there was a general deficiency except in some of the northern districts. In the north of Scotland there was an excess of 74 hours, and in the north-west of England an excess of 62 hours, whilst in the Channel Islands there was a deficiency of 159 hours and in the east of England a deficiency of 103 hours. A discussion of the Greenwich observations shows that the mean temperature for the year was 50·4°, which is 0·3° in excess of the average. The highest monthly mean was 62·2°, in August, the lowest 38·7°, in November. In November the mean temperature for the month was 4·7° below the average of sixty years, and in July it was 4° below the average. In December the mean was 5° in excess of the average, and in October it was 3·5° in excess. The absolutely highest temperature was 82°, in June, the lowest 20°, in January. The greatest range in any month was 48°, in May. There were only two warm days with the temperature above the average in July, and only three in November, but there were about twenty-six warm days both in October and December. November had as many as fifteen frosty nights. The aggregate rainfall was 28 inches, which is 4 inches more than the average, and, with the exception of 1903, it was the heaviest rainfall for thirty years. July was the wettest month, with 3·55 inches, and September the driest, with 0·72 inch. The duration of bright sunshine was about 115 hours' deficient for the year. May was the sunniest month, with 219 hours, and December the least sunny, with about 30 hours.

SEVERAL earthquake shocks have been recorded during the past week. According to Reuter messages, continuous shocks were experienced in the province of Elis, Greece, on December 29, 1910. On December 31 a distinct earth tremor, lasting several seconds, was felt at San Francisco at 4.41 a.m.; and on January 1 a strong shock was felt at Brusa, in Asiatic Turkey.

A TELEGRAPHIC message from the ss. *Cedric* to the Marconi Wireless Telegraph Company on December 29, 1910, published in the *Times* of the following day, stated that the ship had been in communication with the English and French coasts at 1250 miles distance, and with Flores Island on three successive days. The ship was in communication with the European and American coast every day of the passage, and was at the time of telegraphing 1140 miles from New York.

THE Elizabeth Thompson Science Fund was established by Mrs. Elizabeth Thompson, of Stamford, Connecticut, "for the advancement and prosecution of scientific research in its broadest sense." The income from this fund is now available, and the trustees desire to receive applications for appropriations in aid of scientific work. The trustees are disinclined, for the present, to make any grant to meet ordinary expenses of living or to purchase instruments, such as are found commonly in laboratories. Decided preference will be given to applications for small amounts, and grants exceeding 60*l.* will be made only in very exceptional circumstances. Applications for assistance from this fund, in order to receive consideration, must be accompanied by full information, especially in regard to the following points:—(1) precise amount required; (2) exact nature of the investigation proposed; (3) conditions under which the research is to be prosecuted; (4) manner in which the appropriation asked for is to be expended. All applications should reach, before February 1, the secretary of the board of trustees, Dr. C. S. Minot, Harvard Medical School, Boston, Mass., U.S.A.

MR. F. C. SELOUS has been commissioned by the trustees of the British Museum to undertake an expedition to the southern district of the Bahr-el-Ghazal or Lado for the purpose of procuring the head and skin of an adult male of the Sudani race of Lord Derby's eland (*Taurotragus derbianus gigas*). As these antelopes appear to be of a wandering disposition, it is by no means easy to know where to light upon them, and even when found it is somewhat difficult to decide whether to select, for museum purposes, a comparatively young bull with long, unworn horns and a short frontal "brush," or an older animal with shorter horns but a fully developed brush. At present this eland is represented in the exhibition galleries of the natural history branch of the museum by the mounted head of a female and a male skull and horns. Mr. Selous, who has our best wishes for success, starts, we believe, almost immediately.

A CORRESPONDENT of the *Times* of December 28, 1910, records the discovery of what may be called an Arabic Pompeii in the neighbourhood of Cordova. The discovery of this pleasure-resort of the great Khalif Abderrahman III., who erected it between 936 and 961, has been jealously concealed by the Spanish archæologists, and came to light accidentally through the examination of certain fragments of Arabic sculpture of the tenth century recently deposited in the Museum of Cordova. The remains may be assigned to the Egyptian or Copto-Arabic school, and among them the most remarkable are the specimens of glass work with a silver sheen, the secret of which has long been lost, and the painted and glazed pottery made out of calcined clay. So far, the excavations appear to have been most inefficiently conducted, and much valuable material has been destroyed. It may be hoped that the Spanish Government will now arrange for the scientific examination of a site which is likely to supply much information on a little known chapter of the history of Moorish art.

Mr. D. Carruthers, in conjunction with Mr. J. H. Miller and Mr. M. P. Price, left England in March last with the object of exploring zoologically, botanically, and, so far as possible, geographically, the upper part of the basin of the Yenesei and the western frontier of Mongolia. The expedition started in May from Minusinsk, on the Yenesei, up to which point that river is navigable, and finally reached Kuldja on November 14, in the Ili valley in the Tian-shan range, having successfully accomplished the journey along western Mongolia. A preliminary account was given in the *Times* of December 30, 1910, from which it appears that the expedition had first to traverse a belt of virgin forest, which extends in this region from the Yenesei to the Baikal lake, and then passed over a range 5000 to 7000 feet high into an upper basin of the Yenisei. This basin was inhabited thinly by tribes of Finno-Tartar stock, who reside partly in the forest and partly on the more open country of larch groves and pasture land. The forest people are occupied in hunting and herding their domesticated reindeer, of which two breeds were met with. Wild reindeer were also found to occur on the higher parts of the hill ranges above the forests. The western part of the basin was found to be more arid than the forest-clad eastern portion, and in it the inhabitants lived in felt tents. Everywhere signs abounded of former settlements and of an earlier and more advanced civilisation, and evidence seemed to point to an increasing desiccation of the region having been the principal cause of its desiccation here as in other parts of Central Asia. In passing south to Kuldja on the approach of the winter season across the basin of the Upper Irtish, vast deposits of fine mud now being eroded by the hill-streams were met with, and it is suggested that these were deposited in comparatively recent times, when there existed a vast inland sea covering all the river basins of this region, and of which the lakes Balkash, Ala-Kul, Ebi-Nor, &c., are the vestiges. The route for next season may be eastwards along the Tian-shan range to the western margin of the Gobi desert.

It has been long known that there is a considerable bed of low-grade iron ore in the Jurassic rocks of some of the western isles of Scotland, and especially in Raasay. The deposit there has been described by Mr. H. B. Woodward in the Memoirs of the Geological Survey, and analyses published by him showed that the ore agrees in general character, as well as in geological horizon, with the Cleveland ores of Yorkshire. The deposit in Raasay, an island off the north-eastern coast of Skye, covers an area of some 28 square miles. Prospecting work on the deposit has been conducted for some time past by Messrs. Wm. Baird and Co., of Glasgow, and it is now announced that they have secured an option for the purchase of the island, and that they propose to erect blast furnaces there for the smelting of the ore. The extension of the ore bed in Skye has also been examined, but with less promising results. The Raasay ore is of low grade, but its position allows of inexpensive mining. The ore will be used for the production of foundry pig iron.

Some particulars of the proposed work of the German Antarctic Expedition are given by the Berlin correspondent of the *Times* in the issue for January 4. We learn from this source that the Antarctic expedition, under the command of Lieut. Filchner, will leave Germany early this year for Buenos Aires, and will proceed from there at the beginning of October *via* South Georgia and the Sandwich Islands to the Weddell Sea. On arrival in the Weddell Sea it is proposed to establish a base station on the eastern coast so far south as possible, with the necessary equipment for a year's research. A party of ten men will be landed, of whom six—a geologist, a meteorologist, an astronomer, a doctor who is also a biologist, a cook, and a sailor—will stay in the station, while the remaining four will undertake a long sledge expedition into the interior of the South Polar continent. Meanwhile the ship will return to the Atlantic Ocean to carry out coastal observations and oceanographical work. At a meeting held on January 3 in the building of the General Staff, with Prince Henry of Prussia in the chair, the treasurer of the committee which is arranging for the expedition announced that a sum of about 41,250*l.* is in hand. The cost of the vessel and equipment have amounted to 14,500*l.*, and the total cost of the expedition is estimated at 70,000*l.* A lottery has been authorised by the Federal Council, and is expected to produce not less than 27,000*l.*

The expedition of the British Ornithologists' Union to Netherlands New Guinea, continues to labour under extreme difficulties, and the experiences of its members confirms the opinion that New Guinea is one of the most difficult places in which to travel. The jungle which the expedition has encountered is almost impenetrable, and is described as "dismal, dark, dripping," abounding with noxious insects and leeches. The strain and illness have so told on Mr. Goodfellow, the leader, that he has had to return home. Earlier accounts stated that very short people had been met with; the last account describes a true pygmy race inhabiting "the foot-hills of the mountains. These shy and treacherous pygmies, who average 4 feet 6 inches to 4 feet 8 inches in height, wander over the heavy jungle-clad hills and mountains, subsisting on roots and jungle produce, hunting the wallaby, pig, and cassowary, and fishing in the mountain torrents. They dwell in the rudest kind of lean-to huts made of branches and fan palms, with no regular villages, but moving from district to district in search of food. The only metal tool they possessed was a small wedge-shaped piece of iron, 1 inch by 2 inches, inserted into a wooden handle, and answering the purpose of an axe, and with this a whole 20-acre clearing had been made. None but those who have worked and toiled in this dense jungle can really appreciate the perseverance and patience necessary to accomplish this, for many of the trees are from 12 to 15 feet in circumference. This piece of iron was traded up from the coast natives."

On Tuesday, December 20, 1910, in a paper read before the Royal Colonial Institute on the birds of our colonies and their protection, Mr. James Buckland brought a further heavy indictment against the plume-hunter and his trade in our colonies and dependencies, and a powerful appeal in favour of the prohibition of the import of trade feathers. In Australia, New Guinea, New Zealand, India, and the West Indies, the most beautiful members of their avifauna are apparently being so ruthlessly destroyed as to make it no difficult matter to predict their comparatively early extinction. As an example of the havoc wrought by these hunters, Mr. Buckland instances, among many other battues, the slaughter on the island of Losiansky, near Lysan, one of the bird-reservations established in the Pacific by the United States, of 300,000 sea birds before the descent of the Government cutter put a sudden stop to their proceedings. The author of the paper emphasises the enormous value of birds in our tropical and subtropical colonies from an economic point of view, and pictures what would result from the extinction of such species as the straw-necked ibis, which saves the Australian paddocks in their periodical ravages by grasshoppers, of which twenty-five tons can be devoured in a single day by 200,000 of these useful insect eaters. Protection of colonial birds, he pleads, is called for also in the interests of sentiment and hereditary association. "Which is it to be," he asks, "the bird, alive, filling the land with song and beauty and labouring unceasingly for the good of millions of our kinsmen, or the bird, dead, and irreparably lost to our colonies, that a few individuals, whose number is composed largely of the foreign element, may put money in their pockets?"

Mr. Hamel Smith forwards us, in reference to the review of his book, "Aigrettes and Bird Skins," in Nature of December 15, 1910 (p. 207), a number of extracts—unfortunately too long for our limited space—from various notices dealing with the book in the colonial and Indian Press, many of them supporting "a fair hearing for both sides prior to the passing of enactments," and reminds us that his book "suggests the establishment of a close season generally and total prohibition of shooting at any centre where the birds show serious signs of diminishing." In reply to this communication our reviewer repeats that the difficulties and expense of effectively maintaining a close season are prohibitive. The plume-hunter, moreover, apparently devoid of conscience, ignores all laws, regulations, and enactments. The nuptial period is his only harvest time; if stopped in that season his occupation would be gone. The facts already sufficiently established prove that the trade is conducted with the utmost cruelty, that the extermination of many economically valuable species is imminent, and that no close season will effectively stop the slaughter of ornate birds so long as such great emporia as London and other Continental cities remain open. In centres where extermination is imminent, even if proclaimed, the plume-hunter will carry on his trade by stealth when he cannot openly, and will ship away his harvest as "cow-hair," "horse-hair," or under any other specious designation likely to pass the custom house.

In a lengthy letter to the *Times* of December 26, 1910, Dr. Bulloch makes an earnest appeal for the adequate endowment of medical education and research. He points out that the better educated the medical man, the greater the gain to society in general who requires his services. Medical education at present is so expensive that the cost is less than half covered by the fees of the students. We have hospitals unrivalled in the world, but it has been decreed that the generous contributions of those who support them must not be applied to medical education. The public demands the greatest efficiency, yet with few exceptions fails to provide the institutes which are necessary for the training. The donations of generous donors for medical research, such as those of city companies and of Mr. Carnegie and the Beit scholarships, to some extent miss their aim. In the main they go to the researchers, but neglect to provide these with laboratories and training for their work. The teachers who have to train them are overworked and inadequately remunerated; they themselves might, had they the time and opportunity, form the mainstay of medical research in this country. But the research scholarships are usually awarded to relatively young men, and their teachers obtain no help, financial or otherwise.

The *Psychological Review* for November (1910) contains a paper by Mr. T. V. Moore on the influence of temperature and the electric current on the sensibility of the skin. The author finds that the minimum threshold for touch and for spatial threshold is reached when the temperature of the skin is about 36° C., above and below which point the threshold rises. He also concludes that Pflüger's law for the irritability of motor nerves and muscles holds for cutaneous sensibility, which is accordingly decreased at the anode and increased at the kathode pole. Mr. Moore finds that, immediately after the subjection of a skin area to the induced electric current, the sensibility of the touch spots and of the pain spots is lowered considerably, and he believes that under these conditions a touch spot may function as a pain spot.

According to an article by Mr. L. E. Hope, the curator, published in the *Museums Journal* for December, 1910, a local natural history record bureau has been established at the Carlisle Museum. The area of observation includes a radius of fifty miles from the city, and it is to be hoped that an increase in the local fauna list will be the result of the movement. The scheme has been in operation since 1902, and during the last few years the annual number of notes has been between 200 and 300 annually. The idea may be commended to other local museums.

According to an article in the *Times* of December 23, 1910, the relatives of the late Mr. Boyd Alexander are about to present, in accordance with the wishes of the deceased, his large collection of African birds to the British Museum. The specimens are about 4000 in number, and include several species (whether the types is not stated) discovered by the late explorer, among the most interesting of these being Willcocks' honey-guide (*Indicator willcocksi*) and the long-tailed tree-warbler (*Urolais mariae*), the latter representing a generic type of its own. The first portion of the collection was made in the Cape Verdes, a second portion during the Kumasi relief expedition, a third when Mr. Alexander led a column to Gambaga, a fourth in the course of the Alexander-Gosling expedition from the Nile to the Niger, and the last in the islands of the Gulf of Guinea and the Cameruns.

Much interest attaches to a note, by Mr. E. Bidwell, in the October (1910) number of the *Ibis* (ser. 9, vol. iv., p. 759), on fragments of the egg of an ostrich obtained some years ago in a nalla on the Kain River, in the Banda district of the United Provinces of India. Structurally the shell is almost identical with that of the Somali *Struthio molybdophanes*, but the thickness is somewhat greater. The name *S. indicus* is proposed for the species represented by the Banda egg-fragments. It may be mentioned that in ancient literature there are references to the occurrence of large birds in Central Asia, not improbably inclusive of Baluchistan, which could scarcely have been other than ostriches, while in old Chinese works there is mention of ostrich-eggs sent as presents to the emperors. The Assyrian sculptures show, moreover, that ostriches formerly inhabited Mesopotamia. Sub-fossil egg-shells indicate the occurrence of a species (*S. chersonensis*) in the Government of Cherson, in south Russia, while in the Pliocene we have remains of *S. karatheodori* from Samos and of *S. asiaticus* from northern India.

The nature of the colouring of the kingfisher is discussed by Mr. F. J. Stubbs in the *Zoologist* for December, 1910. According to the angle of vision and the position of the spectator with regard to the light, the colour of the feathers on the back of the bird ranges from ultramarine and cobalt, through green, to straw-yellow. The outer layers of the feathers are transparent, and may be removed without interfering with the underlying colour, which is not due to pigment. Beneath the outer layer is a pavement-like arrangement of polyhedral cells, the tops of which are the source of the blue colour. These caps are slightly convex, and when seen by reflected light are blue on both sides. In the author's opinion the origin of the colour may be explained by "the theory of the production of blue by the reflection of light from small particles, and of orange or red by the transmission of light through small particles." It is, in fact, precisely analogous to the colour of the air, the full blue appearing when the feathers are seen by diffused reflected light, while at a low angle, when the light is in part transmitted, the straw-yellow results.

A MONTHLY journal entitled *Peru To-day* is published to give an account of Peruvian development, and from it we learn that the principal cotton-producing districts are near the coast, and are usually vast desert-like valleys irrigated from the rivers flowing from the Andes to the Pacific. Canal irrigation is adopted, and the growers have acquired considerable skill in management. The sugar cultivation is being improved by the introduction of labour-saving devices and more modern machinery; attention is also being paid to drainage. The yield on well-managed estates is very considerably above the average of the country, a fact which indicates that there is still considerable scope for development. An experiment station has been established at Lima for working out agricultural problems.

THE interesting little booklet entitled "West Indies in Canada," that has been drawn up for the Canadian Exhibitions at Toronto and St. John's to give information about the resources of the West Indies and British Guiana, will appeal to a much wider audience than such publications usually find. It contains a map of the West Indies and tables showing their chief exports and imports; then follows an account of each island, including a short history and general description, an account of the climate and sanitary conditions, and of the industries. Unfamiliar crops and operations such as planting bananas are illustrated. A list of books dealing with the West Indies is included, and finally an alphabetical list is drawn up of the products, with a sufficient account of each.

THE Proceedings of the University of Durham Philosophical Society is always an interesting volume, and the current number (part v., vol. iii.) fully maintains the standard set by its predecessors. Mr. Gray reports a severe attack by a furniture pest, *Glycyphagus domesticus*, de Geer, on the contents of the dining and drawing rooms of a new house in Newcastle, which did so much damage that all the infested furniture was destroyed. Prof. Potter describes experiments showing the difference of potential set up by the activity of micro-organisms in culture solutions, and Mr. Horne and Miss Coull give an account of their work on the absorption of water by the seeds of *Vicia Faba*. Engineering subjects are represented by Mr. Eden's paper on the endurance of metals under alternating stresses, and Mr. Dixon's paper on torsional vibrations of massive loaded shafts.

THE Board of Agriculture issues each month an excellent Journal containing papers on technical subjects of importance to farmers, market gardeners, and others, as well as shorter articles and notes on crops, markets, &c. Recent issues contain an article by Mr. K. J. J. Mackenzie, in which he develops his well-known studies of the "points" of livestock, showing how they may to some extent be reduced to actual measurement, and thus become susceptible to exact treatment. Mr. Sawyer gives an account of the sugar beet grown for export in Norfolk, but considers that the price offered—17*s*. 6*d*. per ton—was barely sufficient; he thinks that 20*s*. would have to be offered by factories starting in England. Dr. Russell gives some new analyses of seaweed, and shows that it contains notable quantities of fertilising material; unfortunately, no economical method has yet been discovered of working it up into a saleable manure.

IN the Bulletin of the Imperial Academy of Sciences of St. Petersburg, No. 13, 1910, M. I. P. Tolmachef reports the changes made in the map of the coast between the rivers Khatanga and Anabar by his expedition in 1905. Cape Preobrazhenie is removed more than half a degree to the south. The east coast of the Khatanga Gulf was found to be very irregular, jutting out into three large peninsulas separated by deep inlets, and the St. Nicholas Island does not exist. The entrance to Nordvik Bay faces north, not west. The actual coast-line is marked in red on a cutting from the 100-verst map of Asiatic Russia.

THE Memoir of the Imperial Russian Geographical Society (Statistical Section, vol. x., No. 2) consists of an essay by M. Semionof-of-Tian Shan, on the towns and villages of Russia and their distribution in relation to physical conditions and historical events. The country is divided into three main divisions: the centre and north-west, where agriculture thrives on the watersheds; the northern, where the climate is severe and rural industries (fishing, lumbering, &c.) are pursued on the rivers and lakes; and the black soil of the south, exclusively agricultural, where the population is concentrated in the valleys. The towns are divided into groups according to population and regions, and are treated in connection with the non-rural industries (mining, manufacture, trade, &c.) to which they chiefly owe their origin. Fifty per cent. of the urban population is concentrated on the shores of the Baltic. The article is accompanied by a general map and many sketch-maps illustrating especial subjects.

As the irrigation system in Egypt is continuously being developed, the margin within which improvements may be made becomes narrower, and factors which at first were of minor importance have now to be studied. In the November (1910) number of the *Cairo Scientific Journal* Mr. J. Murray contributes a study of the seepage and evaporation loss from the Ibrahimia canal, which waters the greater part of Middle Egypt. A reach of 132·5 kilometres is investigated, having a width of from 38 to 55 metres between Deirut and Maghagha, and is treated in four sections; in these the loss is found to be 3·9, 2·8, 2·0, and 0·8 metres per second in proceeding from Deirut down stream, and a formula is proposed for reckoning the loss in similar canals in Egypt.

IN the *Cairo Scientific Journal* for November (1910) Mr. H. E. Hurst describes a visit made to some of the oases in the Libyan desert when extending the magnetic survey of the Nile valley to the westward. Traces of the old Egyptian practice of astronomical observation were found in Dakhla oasis in the method of dividing up the day into periods for supplying the water from the flowing wells, and in utilising the rising or setting of certain stars for distributing the water to the land of different shareholders in the water of the spring. The same custom prevails in Baharia oasis, and also in Nubia, where the water is raised from the Nile by water-wheels worked by cattle, and then distributed on the land of each owner in turn.

AT the meeting of the research department of the Royal Geographical Society on December 15, 1910, papers were read by Miss M. Pallis and Mr. R. Gurney on the saline water of that portion of the Norfolk Broads which is drained by the rivers Thurne and Bure. Evidence was brought forward to show that such salinity was only directly due to the tidal water of the sea in the case of the Bure, but in the basin of the Thurne salinity increases inland, and is greatest in Horsey Mere, which is fed by a layer of salt water which percolates from the sea coast and extends to some height above low tide-level. Similar conditions were cited from Holland, where much attention has been given to the mapping of such salt-water table.

AN article relating to the decrease, in recent years, in the frequency and intensity of London fog appeared in the *Times* of December 27, 1910. The statistics given, based on information published by the Meteorological Office, are illustrated by two diagrams, in which the prevalence of fog and bright sunshine in London are shown, in triennial means, by curves. These diagrams are supplemented by the following table:—

| | Days with fog | Hours of bright sunshine |
|---|---|---|
| 1st nine winters, 1883–4 to 1891–2 ... | 29·9 ... | 55·6 |
| 2nd ,, ,, 1892–3 ,, 1900–1 ... | 20·7 ... | 70·1 |
| 3rd ,, ,, 1901–2 ,, 1909–10 ... | 10·6 ... | 93·5 |

The curve relating to fog shows an increase in frequency during the first nine years, a decline subsequently, rapid at first, afterwards gradual. The curve of bright sunshine, although irregular, exhibits a tendency for an increase during the twenty-seven years; since the winter of 1901–2, only one season had fewer than the normal record. Reference is made to a discussion on the subject which took place six years ago at a meeting of the Royal Meteorological Society, when the respective speakers attributed different causes to the improvement in the air of London. The opinion favoured by the writer of the article is that the improvement is due to the more vigorous enforcement of the smoke-prevention clauses of the Public Health Act, the use of gas fires for heating and cooking, and improved methods of lighting. As regards the quality of London fog, these are probably the true reasons; fog, however, usually occurs when an approximation to uniformity of pressure gives rise to a state of stagnation in the atmosphere, and is frequently, though not necessarily, associated with anticyclonic conditions; moreover, the geographical position of London favours the occurrence of fog.

THE present position of Antarctic meteorology is the subject of an interesting and instructive article, by Mr. R. C. Mossman, in the Quarterly Journal of the Royal Meteorological Society for October last. He points out that our knowledge of Antarctic climate, as relating to a continental surface, depends on sledge journeys, the fixed observing stations being largely affected by oceanic influences. One of the most striking features shown by the records at the stations is the low summer temperature to the north of the Antarctic circle, due to pack-ice and to the frequency of fog in low latitudes. The useful tables accompanying the work show that the lowest of the annual mean temperatures was −1·3°, observed by the *Discovery*, being 8·4° lower than that at Cape Adare, some 400 miles to the north. The absolute minimum, observed by the same ship, was −58·5°, but considerably lower readings were recorded on sledge journeys. Precipitation is most difficult to estimate, owing to drifting snow; in the Victoria Land region the Shackleton expedition found an annual fall equal to about 9½ inches of rain. The author estimates the annual amount for the land surface of Antarctica at about 12 inches. The winds are from an easterly direction, but at heights exceeding 15,000 feet the air moves polewards. The Shackleton expedition recognised two high-level currents, the upper from a northerly and the middle from a southerly quarter. The author observes that the subject requires further study, and that after the Pole is reached there will be little inducement for enterprises of a record-breaking character, and then some solid scheme of purely scientific research could be set on foot with some prospect of success.

THE *résumé* of the meeting of the Société française de Physique on December 2, 1910, contains a short account of M. Perot's paper on the luminescence of the mercury arc *in vacuo*. The observations were made on arcs formed in a spherical vessel 10 cm. diameter, the current flowing along a diameter. At very low pressures the discharge fills the whole of the vessel, and has a white appearance. As air is allowed to enter, the discharge concentrates itself and becomes a rose-coloured column not unlike the positive column in a vacuum tube. Mercury is transported from the anode to the kathode. Water vapour destroys the luminescence. An examination of the green line of the spectrum shows that while the principal component is reversed and displaced towards the red as the pressure is increased, the principal satellite is unaffected by pressure. When observed in light emitted in the direction in which the current is flowing and in the reverse direction, respectively, it shows that the luminous centres are travelling with the current with velocities of 30 to 350 metres per second, according to the pressure. M. Perot concludes that the light emission is due to the mercury atoms set in vibration by the impact of electrons, that these atoms encounter inert atoms which they set in motion without rendering luminous, and at each encounter the phase, but not the energy, of the vibration is changed.

A NOTE in the *Builder* for December 31, 1910, gives account of a contradiction to the generally accepted idea that asphalt paving or lining is a barrier to vegetation. The courtyard at the Bank of Italy, in Rome, includes a small garden planted with shrubs, and particularly with Dracæna and Chamærops. Beneath the court is a basement covered by masonry arches, the extrados of which is protected by a layer of asphalt seven-eighths of an inch thick, with the object of preventing the percolation of moisture into the chamber where documents are stored. Some little time ago it was noticed that damp patches had appeared on the ceiling, and that the size of these increased rapidly. On removing the earth from above the masonry it was found that several roots of Chamærops had penetrated right through the asphalt, the holes being of about 0·25 inch in diameter, and almost as clean as if bored by a tool. Being unable to pierce the masonry, the roots had forced their way between it and the asphalt, and, some of them having perished, left holes, through which water passed freely.

COMMENTING on the accident on the Midland Railway at Hawes Junction, the *Engineer* for December 30, 1910, considers that the question of safeguards against fire in trains after collision is not very easily settled. The substitution of electric light for gas is a recommendation which does not meet the whole case. Live coals ejected from the fire-box by the collision have been responsible for starting fires; it is on record that an electrically lighted coach was so destroyed in the Grantham accident; again, the two coaches which first caught fire at Cudworth were so illuminated. The small inverted incandescent gas mantles now employed give an excellent light much appreciated by passengers, and gas commends itself to the companies on account of but little skilled attention being required. Points which might be considered are a more generous use of steel in the body of the coach, and the adoption of fire-proof paint, as on the District Railway. Extinguishers and a few fireman's tools might be provided in every guard's van. Lastly, it might be asked whether it is not possible to reduce the chances of telescoping? It is only natural that the two front coaches of the train in question should be crushed; they were situated between two engines and a sleeping-car weighing about 40 tons. A uniform weight for passenger-carrying vehicles would appear to be a point worthy of attention.

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## *OUR ASTRONOMICAL COLUMN.*

DISCOVERY OF AN EIGHTH-MAGNITUDE NOVA.—A telegram from the Kiel Centralstelle announces that a new star was discovered by Mr. Espin, at Tow-Law, on December 30, 1910. Measurements were made at 7h. 35·9m. G.M.T., and the position of the nova is given as

R.A. = 22h. 32m. 9·5s., dec. = 52° 15′ 21″ N.

This is just circumpolar in our latitudes, and, as the object is at present of the eighth magnitude, numerous observations should be possible, weather permitting.

This object will be known as Nova Lacertæ, as it lies in that constellation, forming the apex—to the north-east—of an approximately equilateral triangle, of which the base is the line joining α and β Lacertæ; it lies in the southern border of the Milky Way in that region. As Lacerta transits during the afternoon, observations should be possible during the greater part of the evening, and as Mr. Espin records "bright lines," spectroscopic observations are desirable wherever possible.

Later reports state that the star is red, and that bright helium and hydrogen lines have been seen in the spectrum. Photographs of the nova were taken at Greenwich on December 31, and the magnitude was reported as 7·5.

METCALF'S COMET, 1910*b*.—A continuation of Dr. Ebell's ephemeris for comet 1910*b* appears in No. 4462 of the *Astronomische Nachrichten.* The present position of the comet lies in Corona at 15h. 52m., +36° 45·4′, and is moving northwards and slightly towards the west; the magnitude is nearly constant at 12·0. Although not very favourably placed for observation, the comet may still be observed during the hours of the early morning.

ELEMENTS FOR FAYE'S COMET, 1910*e*.—From observations made on November 11, 18, and 25, Prof. Ristenpart and Dr. Prager have calculated new elements for comet 1910*e*, and now publish them in No. 4462 of the *Astronomische Nachrichten.* These elements confirm the identity of the comet with Faye's comet, and give the time of perihelion passage as 1910 October 30·04 G.M.T.; the eccentricity of the orbit is given as 0·5169, and the comet's period as 5·96 years.

A set of elliptic elements, calculated by Mr. Meyer and Miss Levy, of the Berkeley Astronomical Department, and published in No. 186 of the Lick Observatory Bulletins, gives the time of perihelion passage as 1910 November 12·413 G.M.T., the eccentricity as 0·5459, and the period as 6·926 years.

A NEW MAP OF THE MOON.—A map of the moon, prepared by Mr. Goodacre, was exhibited during last session at the Royal Astronomical Society, and was enthusiastically received by the selenographers present. Mr. Goodacre now proposes to have the map reproduced on such a scale that the lunar diameter will be 60 inches, and to issue it in the form of twenty-five separate charts, each 13 inches square. If 200 subscribers are forthcoming this can be done at the price of 22*s.* 6*d.* per set. The map shows all the known lunar features, their accurate delineation depending upon the positions of 1433 points given in Mr. Saunder's memoir (the *Observatory*, No. 429).

THE TOTAL ECLIPSE OF THE MOON, NOVEMBER 16, 1910.—Reports of the observations made at a number of Continental observatories during the total lunar eclipse which took place on November 16 appear in No. 4460 of the *Astronomische Nachrichten.*

Dr. Max Wolf gives the times of entry and exit of various features as recorded by a number of observers at Heidelberg; detailed observations of the various colorations of different features are also reported.

Father Fenyi, at Kalocsa, also records colours and remarks on the general brightness of the eclipsed surface; at 12h. 33m. 12·37s. G.M.T. he observed the occultation of the star B.D. + 18° 489.

Occultations and colour variations are also recorded by Herr Mündler, Prof. Küstner, and Dr. Courvoisier.

NINETEEN STARS WITH NEWLY DISCOVERED VARIABLE RADIAL VELOCITIES.—In a paper appearing in vol. xxxii., No. 4, of the *Astrophysical Journal*, Mr. O. J. Lee gives the measures of the spectra of nineteen stars which have recently proved to be spectroscopic binaries. The spectra were photographed at the Yerkes Observatory, the dispersion of one prism being usually employed. The stars are σ Andromedæ, ι Cassiopeiæ, ρ Tauri, ν and φ Geminorum, 42 Camelopardalis, γ Cancri, θ Hydræ, σ Leonis, 23 Comæ Berenices, η and γ Coronæ, ι and π Serpentis, γ Ophiuchi, φ Sagittarii, 13 Vulpeculæ, 16 Lacertæ, and α Pegasi.

The multiple character of some of these stars was announced by Prof. Frost and Mr. Lee at the Cambridge meeting of the Astronomical and Astrophysical Society in August, but ι Cassiopeiæ, γ Ophiuchi, and α Pegasi are now included for the first time. Some of these binaries are members of visual multiple systems, and in others the examination of the H and K lines suggests that the stars may belong to that class of binaries in which the calcium lines appear to have a constant velocity.

OBSERVATIONS OF PLANETS.—The December (1910) number of the *Bulletin de la Société astronomique de France* contains some interesting notes, by M. J. Halley, on observations of Venus made at Roubaix during 1909–10.

M. Halley used a Secretan refractor of 135 mm. aperture, and was favoured with excellent atmospheric conditions. He records, in addition to the bright polar areas, several markings which persisted during his observations; the chief of these is a pair of dark streaks, divided by a bright lane, running from the terminator towards the south; a dark patch, which appeared to lengthen, in the northern hemisphere near the bright limb; and a dark area bordering the bright area at the north pole.

Several of the photographs of Saturn exhibited by Prof. Lowell are reproduced to illustrate a paper on planetary photography which appears in the November (1910) number of the Bulletin.

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## *COLOUR CONTRAST IN PHOTOMICROGRAPHY.*

THE latest of the series of booklets issued from the laboratory of Messrs. Wratten and Wainwright, Ltd., Croydon, deals with photomicrography. This booklet differs from most of the more pretentious works dealing with photomicrography in that but little attention is paid to the instrumental side of the subject, which is dismissed with only a few words of practical advice, attention being concentrated upon the relation between colour and contrast, especially from the point of view of the photography of stained sections.

A perusal of most books on photomicrography indicates that the more difficult parts of the subject technically, such as the high-power photography of diatoms or minute bacteria, receive a somewhat undue amount of attention compared with their importance to the average worker in science, the difficulties which less expert workers find in obtaining really first-rate photographs of sections or preparations being somewhat apt to be overlooked. The greatest difficulty found is usually that the contrast between the structure to be examined and the background is insufficient, and the main control of contrast is supplied by the colour of the light used for illumination.

A coloured object is, of course, coloured by virtue of the property which it possesses of absorbing some of the constituents from white light; if the light reflected from